In the claims:

Please amend the claims pending in the application as reflected in the following listing:

1. (Original) A space variant polarization optical element for spatially manipulating polarization-dependent geometrical phases of an incident light beam, the element comprising a substrate comprising a plurality of zones of gratings with a continuously varying orientation, the orientation denoted by $\theta(x,y)$ which is equal to half of a desired geometrical phase (DGP) modulus 2π, each grating with a local period that is smaller than the wavelength of the incident light beam.

2. (Original) The optical element of claim 1, wherein the orientation of the grating satisfies the equation $2\theta(x,y)=\pi r^2/\lambda f\big|_{\mathrm{mod}2\pi}$, where f is a desired focal length and λ *is* the wavelength of the incident light beam, whereby the optical element is used as a converging lens if the incident light beam exhibits right-hand circular polarization, and as a diverging lens if the incident light beam exhibits left-hand circular polarization.

3. (Original) The optical element of claim 1, wherein the following relation is maintained $\nabla\times\mathbf{K}_g=0$, where $\mathbf{K}_g=K_0(x,y)[\cos(\varphi_d(x,y)/2)\hat{\mathbf{x}}+\sin(\varphi_d(x,y)/2)\hat{\mathbf{y}}]$, where K_g is a grating vector, $\hat{\mathbf{x}}$ and $\hat{\mathbf{y}}$ are unit vectors in the x and y direction, $K_0=2\pi/\Lambda(x,y)$, where K_0 is the spatial frequency of the grating, Λ is the local period of the grating and $\varphi_d(x,y)/2$ is the space-variant direction of the vector so that it is perpendicular to the grating stripes at any given point.

4. (Original) The optical element of claim 1, used as diffraction grating element, wherein the following equation is maintained $\varphi_d=(2\pi/d)x\big|_{\mathrm{mod}2\pi}$, where d is the period of the plurality of zones, and wherein the grating satisfies the relation $\phi_g(x,y)=(2d/\Lambda_0)\sin(\pi x/d)\exp(-\pi y/d)$, where Λ_0 is the local period of the grating at $y=0$.

5. (Original) The optical element of claim 1, wherein the substrate is a wafer.

6. (Original) The optical element of claim 5, wherein the wafer is manufactured using photolithography techniques.

7. (Original) The optical element of claim 6, wherein the wafer is manufactured using etching.

8. (Original) The optical element of claim 1, wherein the grating is in blazed form, with opposite blazed directions for incident left-hand circular polarization and for right-hand circular polarization, of the incident light beam.

9. (Original) The optical element of claim 1, wherein the orientation of the gratings varies linearly in a predetermined direction.

10. (Original) The optical element of claim 1, wherein the orientation of the grating of the zones satisfies the equation $\theta(x) = -\pi x / d|_{\bmod \pi}$, where $\theta(x)$ is the orientation of a grating line at a position x on an axis, and d is the period of the orientation of the grating of the zones.

11. (Original) The optical element of claim 1, wherein it is used as an optical switch.

12. (Original) The optical element of claim 1, wherein it is used as a beam-splitter.

13. (Original) The optical element of claim 1, used as a Lee-type binary subwavelength structure mask.

14. (Original) The optical element of claim 1, wherein it is used for polarimetry.

15. (Original) The optical element of claim 1, wherein the grating in each zone comprise of at least two regions of gratings arranged in different orientations.

16. (Original) The optical element of claim 1, wherein the following relation is satisfied, $\theta(x,y) = \omega(x,y) + c$, where x and y are coordinates of a specific position in an orthogonal set of axes, $\omega = \arctan(y/x)$ is the azimuthal angle, and c is a constant.

17. (Original) The optical element of claim 1, wherein the orientation of the grating is spiral.

18. (Original) The optical element of claim 1, wherein the orientation of the grating satisfies the relation $\theta(r,\omega) = l\omega/2$, where l is a topological charge, and r,ω indicate a specific angular position at radius r and angle ω .

19. (Original) The optical element of claim 18 , wherein the grating satisfy the relation $\phi_g(r,\omega) = (2\pi r_0 / \Lambda_0)(r_0/r)^{l/2-1}\cos[(l/2-1)\omega]/[l/2-1]$ for $l \neq 2$, and $\phi_g(r,\omega) = (2\pi r_0/\Lambda_0)\ln(r/r_0)$ for $l = 2$, where Λ_0 is the local period of the grating .

20. (Original) A space variant polarization optical element for spatially manipulating polarization-dependent geometrical phases of an incident light beam, the element comprising a substrate comprising a plurality of zones of gratings with discretely varying orientation, the

orientation denoted by $\theta(x,y)$ which is equal to half of a desired geometrical phase (DGP) modulus 2π, each grating with a local period that is substantially smaller than the wavelength of the incident light beam.

21. (Original) The optical element of claim 20, wherein the discretely varying orientation comprises rotated orientation.

22. (Original) The optical element of claim 21, wherein the rotated orientation varies linearly.

23. (Original) The optical element of claim 20, used as diffraction grating element, wherein the following equation is maintained $\varphi_d = (2\pi/d)x|_{\mathrm{mod}\,2\pi}$, where d is the period of the plurality of zones, and wherein the grating satisfies the relation $\phi_g(x,y) = (2d/\Lambda_0)\sin(\pi x/d)\exp(-\pi y/d)$, where Λ_0 is the local period of the grating at $y=0$.

24. (Original) The optical element of claim 20, wherein the substrate is a wafer.

25. (Original) The optical element of claim 20, wherein the wafer is manufactured using photolithography techniques.

26. (Original) The optical element of claim 25, wherein the wafer is manufactured using etching.

27. (Original) The optical element of claim 20, wherein the orientation of the grating of the zones satisfies the equation $\theta(x) = -\pi x/d|_{\mathrm{mod}\,\pi}$, where $\theta(x)$ is the orientation of a grating line at a position x on an axis, and d is the period of the orientation of the grating of the zones.

28. (Original) The optical element of claim 20, wherein it is used as an optical switch.

29. (Original) The optical element of claim 20, wherein it is used as a beam-splitter.

30. (Original) The optical element of claim 20, used as a Lee-type binary subwavelength structure mask.

31. (Original) The optical element of claim 20, wherein it is used for polarimetry.

32. (Original) The optical element of claim 20, wherein the grating in each zone comprise of at least two regions of gratings arranged in different orientations.

33. (Original) The optical element of claim 20, wherein the following relation is satisfied, $\theta(x,y) = \omega(x,y) + c$, where x and y are coordinates of a specific position in an orthogonal set of axes, $\omega = \arctan(y/x)$ is the azimuthal angle, and c is a constant.

34. (Original) The optical element of claim 20, wherein the orientation of the grating satisfies the relation $\theta(r,\omega) = l\omega/2$, where l is a topological charge, and r,ω indicate a specific angular position at radius r and angle ω.

35. (Original) The optical element of claim 34 , wherein the grating satisfy the relation $\phi_g(r,\omega) = (2\pi r_0/\Lambda_0)(r_0/r)^{l/2-1}\cos[(l/2-1)\omega]/[l/2-1]$ for $l \neq 2$, and $\phi_g(r,\omega) = (2\pi r_0/\Lambda_0)\ln(r/r_0)$ for $l = 2$, where Λ_0 is the local period of the grating .

36. (Original) The optical element of claim 20, wherein the zones of gratings are arranged in an annular manner.

37. (Original) The optical element of claim 20, wherein the zones of gratings are arranged in a coaxial manner.

38. (Original) A method for spatially manipulating polarization-dependent geometrical phases of an incident light beam, the method comprising:

providing a substrate comprising a plurality of zones of gratings, with a continuously varying orientation, the orientation denoted by $\theta(x,y)$ which is equal to half of a desired geometrical phase (DGP) modulus 2π, each grating having a local period that is smaller than the wavelength of the incident light beam

irradiating the incident light beam onto the substrate.

39. (Original) The method of claim 38, wherein the orientation of the grating satisfies the equation $2\theta(x,y) = \pi r^2/\lambda f\big|_{\mathrm{mod}2\pi}$, where f is a desired focal length and λ *is* the wavelength of the incident light beam, whereby the optical element is used as a converging lens if the incident light beam exhibits right-hand circular polarization, and as a diverging lens if the incident light beam exhibits left-hand circular polarization.

40. (Original) The method of claim 38, wherein the following relation is maintained $\nabla \times \mathbf{K}_g = 0$, where $\mathbf{K}_g = K_0(x,y)[\cos(\varphi_d(x,y)/2)\hat{\mathbf{x}} + \sin(\varphi_d(x,y)/2)\hat{\mathbf{y}}]$, where K_g is a grating vector, $\hat{\mathbf{x}}$ and $\hat{\mathbf{y}}$ are unit vectors in the x and y direction, $K_0 = 2\pi/\Lambda(x,y)$, where K_0 is the spatial frequency of the grating, Λ is the local period of the grating and $\varphi_d(x,y)/2$ is the space-variant direction of the vector so that it is perpendicular to the grating stripes at any given point.

41. (Original) The method of claim 38, used as diffraction grating element, wherein the following equation is maintained $\varphi_d = (2\pi / d)x|_{\mathrm{mod}\,2\pi}$, where d is the period of the plurality of zones, and wherein the grating satisfies the relation $\phi_g(x, y) = (2d / \Lambda_0)\sin(\pi x / d)\exp(-\pi y / d)$, where Λ_0 is the local period of the grating at $y=0$.

42. (Original) The method of claim 38, wherein the grating is in blazed form, with opposite blazed directions for incident left-hand circular polarization and for right-hand circular polarization, of the incident light beam.

43. (Original) The method of claim 38, wherein the orientation of the gratings varies linearly in a predetermined direction.

44. (Original) The method of claim 38, wherein the orientation of the grating of the zones satisfies the equation $\theta(x) = -\pi x / d|_{\mathrm{mod}\,\pi}$, where $\theta(x)$ is the orientation of a grating line at a position x on an axis, and d is the period of the orientation of the grating of the zones.

45. (Original) The method of claim 38, wherein it is used for optical switching.

46. (Original) The method of claim 38, wherein it is used for beam-splitting.

47. (Original) The method of claim 38, wherein it is used for polarimetry.

48. (Original) The method of claim 38, wherein the grating in each zone comprise of at least two regions of gratings arranged in different orientations.

49. (Original) The method of claim 38, wherein the following relation is satisfied, $\theta(x, y) = \omega(x, y) + c$, where x and y are coordinates of a specific position in an orthogonal set of axes, $\omega = \arctan(y/x)$ is the azimuthal angle, and c is a constant.

50. (Original) The method of claim 38, wherein the orientation of the grating is spiral.

51. (Original) The method of claim 38, wherein the orientation of the grating satisfies the relation $\theta(r,\omega) = l\omega / 2$, where l is a topological charge, and r,ω indicate a specific angular position at radius r and angle ω.

52. (Original) The method of claim 51 , wherein the grating satisfy the relation $\phi_g(r,\omega) = (2\pi r_0 / \Lambda_0)(r_0 / r)^{l/2-1} \cos[(l/2-1)\omega] / [l/2-1]$ for $l \neq 2$, and $\phi_g(r,\omega) = (2\pi r_0 / \Lambda_0)\ln(r / r_0)$ for $l = 2$, where Λ_0 is the local period of the grating .

53. (Original) A method for spatially manipulating polarization-dependent geometrical phases of an incident light beam, the method comprising:

providing a substrate comprising a plurality of zones of gratings with discretely varying orientation, the orientation denoted by $\theta(x,y)$ that is equal to half of a desired geometrical phase (DGP) modulus 2π, each grating with a local period that is substantially smaller than the wavelength of the incident light beam;

irradiating the light beam on the substrate.

54. (Original) The method of claim 53, wherein the discretely varying orientation comprises rotated orientation.

55. (Original) The method of claim 54, wherein the rotated orientation varies linearly.

56. (Original) The method of claim 54, used as diffraction grating element, wherein the following equation is maintained $\varphi_d = (2\pi / d)x|_{\mathrm{mod}\,2\pi}$, where d is the period of the plurality of zones, and wherein the grating satisfies the relation $\phi_g(x,y) = (2d/\Lambda_0)\sin(\pi x/d)\exp(-\pi y/d)$, where Λ_0 is the subwavelength period at $y=0$.

57. (Original) The method of claim 54, wherein the orientation of the grating of the zones satisfies the equation $\theta(x) = -\pi x/d|_{\mathrm{mod}\,\pi}$, where $\theta(x)$ is the orientation of a grating line at a position x on an axis, and d is the period of the orientation of the grating of the zones.

58. (Original) The method of claim 53, wherein it is used for optical switching.

59. (Original) The method of claim 53, wherein it is used for beam-splitting.

60. (Original) The method of claim 53, wherein it is used for polarimetry.

61. (Original) The method of claim 53, wherein the grating in each zone comprise of at least two regions of gratings arranged in different orientations.

62. (Original) The method of claim 53, wherein the following relation is satisfied, $\theta(x,y) = \omega(x,y) + c$, where x and y are coordinates of a specific position in an orthogonal set of axes, $\omega = \arctan(y/x)$ is the azimuthal angle, and c is a constant.

63. (Original) The method of claim 53, wherein the orientation of the grating satisfies the relation $\theta(r,\omega) = l\omega/2$, where l is a topological charge, and r,ω indicate a specific angular position at radius r and angle ω.

64. (Original) The method of claim 63, wherein the grating satisfy the relation

$\phi_g(r,\omega) = (2\pi r_0 / \Lambda_0)(r_0 / r)^{l/2-1} \cos[(l/2-1)\omega] / [l/2-1]$ for $l \neq 2$, and

$\phi_g(r,\omega) = (2\pi r_0 / \Lambda_0) \ln(r / r_0)$ for $l = 2$, where Λ_0 is the local period of the grating.

65. (Original) The method of claim 53, wherein the zones of gratings are arranged in an annular manner.

66. (Original) The method of claim 53, wherein the zones of gratings are arranged in a coaxial manner.

67-68. (Cancelled)